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SOVIET RARE METALS STANDARDS, USES, ALLOCATIONSRedkiye Metally
Moscow, 1951

O. A. Songina

[Comment: The following was taken from the book Redkiye Metally, by O. A. Songina, published by Metallurgizdat, Moscow, 1951.]

Tungsten

About 90 percent of all Soviet tungsten output (ore concentrate) is used in the production of ferrotungsten.

Approximately 2 percent of all tungsten output is used in the production of stellites. The usual composition range of these stellites is as follows: 3-15 percent W, 25-35 percent Cr, 45-65 percent Co, 0.5-2.7 percent C.

Tungsten salts are used to fireproof some fabrics. Heavy, expensive silks owe their beauty to the tungsten salts with which they are permeated.

Pure tungsten is used in chemical analyses. Tungsten compounds are used as catalysts.

Molybdenum

The steel industry uses about 90 percent of all USSR molybdenum output. Molybdenum is introduced into steel either in the form of ferromolybdenum, with about an 80 percent molybdenum content, or in the form of calcium molybdate. The latter is currently regarded as preferable.

Rhenium

Rhenium has not yet found extensive application in the USSR.

Tantalum

Lately, tantalum has been used in pipes used in the manufacture of hydrochloric acid. The high initial cost of such pipelines is compensated for by their virtually unlimited length of service.

Tantalum is used in super-hard alloys because of its ability to form the hard carbide TiC.

Columbium

Ferrocolumbium, with up to 60 percent columbium, is used to introduce columbium into steel. Ferrocolumbium is produced either by the direct smelting of concentrates in an electric furnace or by the aluminothermic method.

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Titanium

Armor plate is strengthened when "titanized," i.e., when the plate is coated with titanium powder and heated in an atmosphere of hydrogen, thus diffusing the titanium into the steel case.

Gallium

Gallium is not toxic and is therefore used in dental fillings (50 percent Sn, 34 percent Bi, 15 percent Cd, 1 percent Ga).

Indium

Indium is rather widely used. Automotive and aircraft engine silver-cadmium and copper-lead bearings are plated with indium.

Thallium

Thallium is used in some lead (20-65 percent Tl), and silver (10-22 percent Tl) corrosion-resistant alloys. It is also used in electrodes for copper electrolysis (70 percent Pb, 20 percent Sn, 10 percent Tl) and in some bearing alloys (72 percent Pb, 8 percent Tl, 15 percent Sb, 5 percent Sn).

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Tungsten Concentrates (GOST 213-49)

Chemical Composition in Percent

Grade	Tungsten Anhydride (minimum)	Manganese Oxide	Silicon Dioxide	Phos- phorus	Sulfur	Arsenic	Tin	Copper	Molybdenum	Uses
KVG1	63	18	5	0.03	0.6	0.10	0.10	0.18		Ferrotungsten V1
KVG2	60	18	5	0.04	0.8	0.10	0.15	0.22		Ferrotungsten V2
KVG3	60	18	5	0.05	0.8	0.20	0.20	0.22		Ferrotungsten V3
KSh1	55	4	10	0.04	0.6	0.05	0.08	0.17		Ferrotungsten V1
KSh2	50	4	10	0.08	0.8	0.08	0.15	0.19		Ferrotungsten V2
KSh3	50	4	10	0.11	0.8	0.20	0.20	0.20		Ferrotungsten V3
KMSH1	65	0.10	1.5	0.04	0.3	0.04	0.05	0.10	2-4.5	Ferrotungsten V1a
KMSH2	60	0.10	3.0	0.08	0.5	0.05	0.05	0.10	2-4.5	Ferrotungsten V2a
KVGA	60		5	0.2	3	0.1	1.5		0.06	Tungsten anhydride
KVGK	60		5	0.1	3	0.1	1.5		0.01	Tungstic acid
KShA1	50				3	0.1	1.5		0.05	Tungsten anhydride
KShA2	40			0.2	3	0.1	1.5			Tungsten anhydride
KShA3	40				3	0.1	1.5		0.25	Tungsten anhydride

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Average Composition of Molybdenite and Technical Specifications for
Molbdenum Concentrate (GOST 212-48)
(In percent)

<u>Molybdenite</u>	<u>Mo</u>	<u>Pb</u>	<u>Cu</u>	<u>Zn</u>	<u>Fe</u>	<u>As</u>	<u>CaO</u>	<u>MgO</u>	<u>MnO</u>	<u>Al₂O₃</u>	<u>SiO₂</u>	<u>P</u>	<u>Sn</u>	<u>Uses</u>
Veiny	0.42	0.015			3.07	Traces	3.5	1.07	0.14	2.52	86.50	Not de-		
Skarny	0.48		0.02	0.03	9.36	0.07	17.33	1.44	0.28	7.61	58.22	termined		
												"		
<u>Concentrate</u>														
KM1	50		0.5			0.07					5	0.07	0.07	Ferromolybdenum Mol
KM2	48		1.0			0.07					7	0.07	0.07	Ferromolybdenum Mol
KM3	47		2.0			0.07					9	0.15	0.07	Ferromolybdenum Mo2, Mo3, calcium molybdate

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